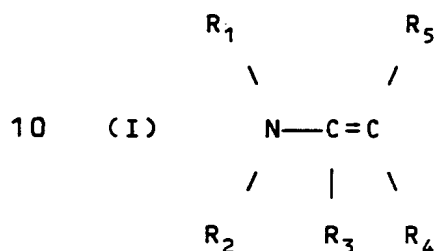


C l a i m s

1. Vulcanization accelerators constituted by compounds, derived from secondary amines, belonging to the class of enamines.

5        2. Vulcanization accelerators constituted by compounds belonging to the class of enamines, having the general formula (I):



wherein:

- $R_1$  and  $R_2$ , which are the same, or can be different from each other, represent an either linear or branched-chain  $C_1-C_{18}$  alkyl radical; a  $C_2-C_{18}$  alkenyl radical; a  $C_3-C_8$  cycloalkyl radical; a  $C_6-C_{18}$  aryl radical; a  $C_7-C_{20}$  alkylaryl or arylalkyl radical; or  $R_1$  and  $R_2$ , taken jointly and together with the nitrogen atom, represent a  $C_3-C_8$  heterocyclic radical, possibly containing a second heteroatom selected from O, S and N;
- $R_3$  and  $R_4$ , which are the same, or can be different from each other, represent a hydrogen atom; an either linear or branched-chain  $C_1-C_{18}$  alkyl radical; a  $C_2-C_{18}$  alkenyl radical; a  $C_6-C_{18}$  aryl radical; a  $C_7-C_{20}$  alkylaryl or arylalkyl radical; or  $R_3$  and  $R_4$ , taken jointly and together with the C=C double bond to which they are bonded, represent a  $C_3-C_{12}$  cycloalkenyl radical;

--  $R_5$  represents a hydrogen atom; an either linear or branched-chain  $C_1-C_{18}$  alkyl radical; a  $C_2-C_{18}$  alkenyl radical; or in the case when  $R_3$  represents a hydrogen atom, an either linear or branched  $C_1-C_{18}$  alkyl radical, a  $C_2-C_{18}$  alkenyl radical, a  $C_6-C_{18}$  aryl radical or a  $C_7-C_{20}$  alkylaryl or arylalkyl radical,  $R_4$  and  $R_5$ , taken jointly and together with the carbon atom bearing the  $C=C$  double bond, represent a  $C_3-C_{12}$  cycloalkylenic radical.

10 3. Vulcanization accelerators according to claim 2, in which  $R_1$  and  $R_2$  are methyl, ethyl, propyl, pentyl, hexyl, heptyl, ethylhexyl, butyl, octyl, phenyl.

15 4. Vulcanization accelerators according to claim 2, in which the  $C_3-C_8$  heterocyclic radicals, in the case when  $R_1$  and  $R_2$  are taken jointly and together with the nitrogen atom, are morpholine, pyrrolidine, piperidine, piperazine, thiomorpholine, thiazolidine, benzothiazolidine.

20 5. Vulcanization accelerators according to claim 2, in which  $R_3$  and  $R_4$  radicals are methyl, ethyl, propyl, butyl, phenyl.

25 6. Vulcanization accelerators according to claim 2, in which the  $C_3-C_{12}$  cycloalkenylic radicals, in the case when  $R_3$  and  $R_4$  are taken jointly and together with the  $C=C$  double bond to which they are bonded, are cyclopentene, cyclohexene, cycloheptene, cyclooctene, cyclododecene.

30 7. Vulcanization accelerators according to claim 2, in which  $R_5$  radicals are methyl, ethyl, propyl,

butyl, hexyl, heptyl.

8. Vulcanization accelerators according to claim 2, in which the C<sub>3</sub>-C<sub>12</sub> cycloalkylenic radicals, in the case when R<sub>4</sub> and R<sub>5</sub> are taken jointly and together with the carbon atom bearing the C=C double bond, are cyclohexylidene, cyclooctylidene.

9. Process for synthesizing the vulcanization accelerators according to any of the preceding claims, which comprises the reaction of 1 mol of a secondary amine having the general formula (II):



in which R<sub>1</sub> and R<sub>2</sub> have the same meaning as disclosed above, with 0.5 mol of an aliphatic or an alicyclic aldehyde or of an open or cyclic ketone, having at least 1 hydrogen atom in alpha-position to the aldehydic or ketonic carbonyl group, in the presence of a catalyst, at temperatures comprised within the range of from 20°C to 120°C, under the atmospheric pressure and during a time of from 0.5 to 8 hours.

10. Process according to claim 9, in which the secondary amines having the general formula (II) are morpholine, piperidine, pyrrolidine, dimethylamine, dipropylamine, diethylamine, dibutylamine, diisopropylamine, dibenzylamine, dicyclohexylamine, N-alkyl-aryl amines, piperazine, diallylamine, thiazolidine, thiomorpholine.

11. Process according to claim 9, in which the aliphatic or alicyclic aldehydes are butyraldehyde, n-hexaldehyde, n-heptaldehyde, n-octaldehyde, cyclohexanecarboxyaldehyde, cyclooctylaldehyde.

12. Process according to claim 9, in which the open or cyclic ketones are cyclopentanone, cyclohexanone, methyl-ethyl-ketone, methyl-butyl-ketone, butyrophenone.

5 13. Use of the vulcanization accelerators according to any of claims from 1 to 8, in either natural or synthetic rubber.

14. Use of the vulcanization accelerators according to claim 13, in which the synthetic rubber are selected from SBR, NBR, BR, EPDM.

15. Use of the vulcanization accelerators according to claim 13 or 14, either as the only vulcanization accelerators, or in combination with other vulcanization accelerators.

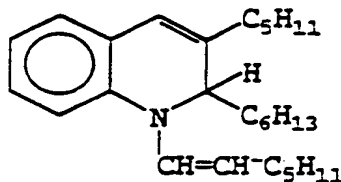
15 16. Use of the vulcanization accelerators according to claim 15, in combination with mercapto-benzothiazole sulfenamides.

17. Manufactured articles obtained from the vulcanization of natural or synthetic rubbers in the presence of vulcanization accelerators according to any of claims 1-8.

18. As novel compound, the enamine having the formula (III):

25

(III)



useful as a vulcanization accelerator.

30 19. Compound according to claim 18, useful as a

33.

vulcanization accelerator in natural or synthetic rubbers.

20. Compound according to claim 19, in which the synthetic rubbers are selected from SBR, NBR, BR,  
5 EPDM.